

mous types." All that we can say here is that we have no doubt that under the name of phthisis have been comprehended at least three distinct species of disease,—one of which belongs to our present species, and is, in all respects, a purulent and not a tubercular affection. The secretion of tubercle and the secretion of pus are separate acts of the system, each of which must exist separately. Tubercular consumption may terminate without the formation of pus, as I think I once witnessed, and apostematous consumption is not necessarily connected with the previous existence, although I will admit that it may come on after the deposition of tubercles in the lungs. De Haen, as we have before seen, was unable to discover in persons who died of purulent consumption any "*mark of ulceration, or even the spot in which the pus had been formed*,—and in cases of the kind, so completely was the blood transformed into pus, that Dr. Hake observes, that "in the last stages of phthisis, the blood was found by Dr. Carswell and myself, to contain *no other globules than those of pus*." I cannot help, however, believing, that all these diseases are internally connected with a strumous or tuberculous disposition in the system, and they lead very naturally to the next general division of our subject.

LIBERTY COUNTY, GA., March 31st, 1846.

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ART. VIII.—*Some Statistics of Small-pox and Vaccination.* By J. F. W.  
LANE, M. D., Boston.

WITHIN a comparatively recent period the importance of vaccination has been so carelessly and heedlessly discussed by medical men, that even the public are beginning to call in question its efficacy, and to demand at the hands of its practitioners a fair and candid statement of its actual value. It is urged that the cases of small-pox, after vaccination, have increased in frequency. If this be so, why is it? Has the vaccine virus been modified by its frequent transmission through the human system? Is its protective power of limited duration? What degree of blame, if any, can be attached to the careless application of matter by those unacquainted with the true character of the vesicle? These, and a host of other questions arise, for which answers must be sought by patient industry and searching investigation. Theory, mere speculative theory must be rejected from our examination; and data, statistical tables alone, be taken for the foundation of the superstructure,—a humble tombstone in memory of Jenner! Perhaps some law may be dimly discerned, but to discover the *laws of vaccination* were too much to expect as yet, for not half a century has elapsed since the practice was introduced to public notice by the celebrated inquiry of Jenner, (about the last of June, 1798,) and the question of revaccination is still in bitter contest, a question which time and epidemics can alone correctly answer.

These and other similar causes, not less than the degree of respect due to the memory of Jenner, imperatively call for a thorough and candid examination of the subject. Data must be collected from whatever source they can be gathered, and carefully arranged so that some general principles may be deduced therefrom. In the course of the following investigation great impediment has been experienced from the want of such statistical tables in this country as can be relied upon. The imperfections of the bills of mortality throughout the entire country are such as to throw doubts upon any deductions in regard to a particular point drawn from them only. Those of Boston, New York, Philadelphia, and Baltimore for a considerable series of years have been looked over, but little use has been made of them on this account.

It were foreign to our purpose to examine very minutely into the history of the various epidemics of variola since the flood, or, with some writers, to attempt to establish that the subject treated of is mentioned in the Old Testament. Thus Willan, upon the authority of Philo, finds the description by Moses of the plague of boils and blains perfectly adapted to the small-pox, some fifteen hundred years before the Christian era. So, also, the Chinese, claiming upon the score of antiquity every modern invention, must be allowed to have had, by their own testimony, the small-pox for at least 3000 years. We shall simply consider its fatality under known circumstances and in particular places.

Upon the authority of Dr. Baron, according to the researches of Black, Lüssmileh and Frank, eight or nine per cent. of the human race were carried off by small-pox. Duvillard estimates that only four out of the hundred reach the age of thirty without having it; that one in seven or eight of those attacked dies, and of those attacked in infancy only two-thirds escape. Dr. Cross, in his work upon the variolous epidemic of Norwich, 1819, furnishes the following table of the ages of 530 persons who were cut off by the disease of that year:

Under 2 years of age	-	-	-	-	260
Aged from 2 to 4 years,	-	-	-	-	132
" 4 " 6 "	-	-	-	-	85
" 6 " 8 "	-	-	-	-	26
" 8 " 10 "	-	-	-	-	17
" 10 " 15 "	-	-	-	-	5
" 15 " 20 "	-	-	-	-	2
" 20 " 30 "	-	-	-	-	2
" 30 " 40 "	-	-	-	-	1
				Total	530

What proportion of these were *unvaccinated* he does not inform us, but from the general tenor of his work and subsequent remarks, we are led to infer that, with the exception of perhaps five, they were all in this condition.

In the *Annuaire des Longitudes* is given a table, formed by M. Mathieu, of the deaths from small-pox in the city of Paris, during the year 1830, arranged according to the ages.

Ages.	Males.	Females.	Total.
From birth to 6 months	4	5	9
" 6 months to 1 year	25	20	45
" 1 to 2 years	21	27	48
" 2 to 3 "	25	43	68
" 3 to 4 "	38	34	72
" 4 to 5 "	38	22	60
" 5 to 6 "	14	17	31
" 6 to 7 "	18	15	33
" 7 to 8 "	6	8	14
" 8 to 9 "	3	6	9
" 9 to 10 "	2	2	4
" 10 to 11 "	4	5	9
" 11 to 12 "	2	3	5
" 12 to 13 "	2	3	5
" 13 to 14 "	1	1	2
" 15 to 20 "	24	15	39
" 20 to 25 "	22	8	30
" 25 to 30 "	13	12	25
" 30 to 35 "	5	2	7
" 35 to 40 "	0	1	1
" 40 to 45 "	0	1	1
" 45 to 50 "	0	1	1
" 50 to 55 "	0	1	1
" 55 to 60 "	0	1	1
" 60 to 62 "	0	1	1
Total,	269	255	524

From these tables, recorded by M. J. B. Bousquet in his work upon variolous or varioliform eruptions, prepared by direction of the French government, in 1833, the inference may be drawn that small-pox is very rare from birth to 6 months of age; on the contrary it is very common from that period to 7 years, and again, from 15 to 30 years, the interval being passed in greater security, which will hereafter be seen to be the probable result of vaccination.

In the epidemic of Marseilles no infant under 3 months of age was attacked.

In his volume upon the Wurtemberg epidemic, Keim gives the ages of 37 persons attacked with natural small-pox to have been:

Under 3 years of age,	20
From 15 to 22	7
" 30 to 40	4
Unknown,	6
	— 37

From the London bills of mortality calculations have been made that at the commencement of the eighteenth century about one-fourteenth of the population died of the small-pox.

In Boston, Mass., the small-pox prevailed epidemically in 1649, 1666, 1678, 1690, and 1702, at the last period 302 died, being not far from 44 per 1000 of the inhabitants. In 1721 it prevailed again, and with great violence, for 5759 persons (more than half the inhabitants), had it in the natural way, of whom 844, or 1 in 7, died. In this same year the practice of inoculation was introduced, and 247 underwent the operation, of whom 6, or 1 in 42, died. The remaining tables of that city I reserve till upon the practice of inoculation, for in them is displayed the great con-

trast, even at that period, of the comparative fatality of the natural and the inoculated small-pox."

The following table of the deaths by variola, at Copenhagen, from 1749 to 1808, is collected by Dezeimeris from the records of Denmark:

From 1749 to 1758	2991 persons.
" 1759 to 1768	2068 "
" 1769 to 1778	2224 "
" 1779 to 1788	2028 "
" 1789 to 1798	2920 "
" 1799 to 1808	724 "

This sudden decrease can only be ascribed to the introduction of vaccination, under which head I shall examine more in detail the last decennial period, in the first two years of which (1799 and 1800) vaccination had not been introduced.

In the second Annual Report of the Registrar-General of Births, Deaths, and Marriages in England, published in 1840, it is shown that the deaths from small-pox in 324 divisions of the kingdom, from July 1st, 1837 to Dec. 31st, 1839, amounted to upwards of 30,819 persons, being, on an average, about 12,000 per annum; now, taking the allowed mortality at 1 in 4, or 25 per cent. of those attacked, and it follows, that nearly 50,000 cases of small-pox occurred during that year. Moreover, the total number of deaths in England and Wales, with a population of 13,897,187, (according to the census of 1831,) from July 1st, 1838 to June 30th, 1839, inclusive, was 331,007, of which 13,023 were deaths by small-pox. The number of deaths in England and Wales for the year 1838 was 342,529, of which small-pox was the occasion in 8,639 males, 7629 females,—total 16,268, making a proportional per cent. of 5·125 in males, and of 4·710 in females.

From the following table of the ages of 8,714 persons who died of this disease in 1839, prepared, probably, without reference to vaccination, (for of this point I do not find any mention made,) the disease appears at least more fatal, if not more general, in its attacks upon infancy and childhood under the age of 10 years; nor does it appear, as some writers would have us imagine, that those under 6 months escape with impunity:

MONTHS. Ages.	Males and Females.	YEARS Ages.	Males and Females.	YEARS Ages.	Males and Females.	YEARS, Ages.	Males and Females.
0	202	1	1524	25	148	65	10
1	181	2	1197	30	93	70	10
2	162	3	869	35	75	75	4
3	456	4	628	40	43	80	10
6	646	5	1122	45	22	85	1
9	588	10	206	50	13	90	0
		15	226	55	10	95	1
Total,	2235	20	240	60	19	Uncert.	8
						Total,	8714

Our conclusions then are :

- 1st. That small-pox is more frequently a disease of early childhood.
- 2d. That it appears to have increased in frequency.

1. *Inoculation.*—The first systematic attempt to check the ravages of this fatal scourge was made in 1722, by the introduction of the practice of

inoculation with the small-pox into Europe from Turkey. Previous to this period, however, a work had been published in England (1714) by Dr. Timoni, of Constantinople; and also in 1715 one by a surgeon who had been in Turkey, Mr. Kennedy, advocating this mode of practice. Somewhere during the year 1717, Lady Mary Wortley Montague, wife of the British ambassador, Mr. Wortley, and at that time residing with her husband in Constantinople, caused her son Edward to be inoculated for the small-pox by Mr. Maitland, the surgeon of the embassy. In her letters home about this period she praises in the highest terms the new practice; and after her return, in 1722, she caused her daughter to be inoculated by the same gentleman, which was the first step towards the general introduction of the practice. The second individual was the daughter of Dr. Keith, of London; some of the royal family were also inoculated at a very early period, but still the practice did not at once meet with general favour.

A greater fatality seems to have attended its early course than existed in those countries from which it was introduced, arising, it may be, from inattention to previous treatment, for this fatality appears to have diminished as the operation became more generally diffused. Thus during the first eight years after its introduction 845 were inoculated, of whom 17 died, rather above 2 per cent.; according to Dr. Cross, 897 individuals submitted to this operation during these first eight years, of whom 17 died, rather below 2 per cent.; if we adopt either of these estimates we shall find the ratio of mortality to be greatly diminished below that of the small-pox in its natural form. Dr. Jurin examined the London bills of mortality for the period of 52 years, and estimates, that of all those attacked with the natural small-pox, of whatsoever age, one in five or six dies; but of the inoculated only one in fifty dies.

In the city of Boston (consult Shattuck on the Vital Statistics of Boston), the small-pox appeared as an epidemic in 1721, 1730, 1752, 1764, 1776, 1778, 1792, with varying degrees of fatality. The subsequent table presents in beautiful contrast the effects of the natural and the inoculated small-pox :

Year.	Cases.	Deaths.	Ratio per 1000 of the population.		Natural.			Inoculated.		
			Sick.	Died.	Cases.	Deaths	Ratio per 1000	Cases.	Deaths	Ratio per 1000
1721	6006	850	546	77	5759	844	148	247	6	24
1730	4000	500	266	33	3600	488	135	400	12	30
1752	7669	569	489	36	5545	539	97	2124	30	17
1764	5646	170	364	11	669	121	185	4977	46	9
1776	5292	57	411	10	304	29	95	4988	18	5
1778	2243	61	166	4	122	42	344	2121	29	9
1792	8346	198	460	10	232	33	142	8114	165	18

During this latter year (1792) the town is estimated to have contained about 18,000 inhabitants, of whom 10,655 were supposed to have had the disease, 262 removed out of town, and 221 only of those who were liable escaped.

It has been calculated, that in England during the last thirty years of the last century, when the small-pox inoculation was most in vogue, the mortality from being one-fourteenth of the entire population, had augmented to one-tenth. Sir Gilbert Blane estimated the annual loss of life in Great Britain and Ireland during this period at 36,000; and Dr. Lettsom estimates it to

have been 34,260; even this he considers below the truth. In these estimates, laid before the Committee of the House of Commons, the latter gentleman asserts, that in the 42 years between 1667 and 1722, the average number of deaths by the small-pox was to the entire number of deaths from all diseases as 72 to 1000; but that in the 42 years from 1731 to 1772, when the practice of inoculation was in constant use, the proportion was 89 in 1000. The former gentleman also advanced the calculation of Dr. Heberden before the same committee, making the deaths by the small-pox during the first thirty years of the last century to have been 70 in 1000, but during the last thirty years 95 in 1000.

Condamine in France, and Rosenstein in Sweden, calculate the deaths under the same circumstances to have been one-tenth of the births.

Great respect must also be given to the opinion of Dr. Gregory, of the Small-pox Hospital in London, who, as late as Feb., 1845, has taken the ground that it is unwise to prevent variolous inoculation entirely. He argues, that since small-pox after vaccination proves fatal at the rate of 7 per cent., while inoculated small-pox is only fatal in one-fifth per cent., therefore, persons verging on puberty might, with increase of safety, be inoculated, even if they have been vaccinated in infancy.

This apparent increase is beyond doubt deceptive, for while the actual mortality of the mass was increased, the individual was better protected. By the practice of inoculation the seeds of the distemper were kept ever alive, which, like a spark upon the hearth, the breath might fan into a flame. While confined to the individual it was comparatively a safe agent, but when bursting from control it rushed through the community its march was terrific, and for that outbreak the germs always existed.

The practice of inoculation with the small-pox was then to the individual one of safety, but to the mass of society fraught with danger.

2. *Secondary Small-pox*, or the occurrence of the small-pox after the individual had once had the disease, whether by inoculation or in the natural way, (for to this I would here restrict the term,) is found to have been of much greater frequency than physicians in general allowed or acknowledged, till since the introduction of vaccination. Some data to bear upon this point, if introduced in this place, may serve in a measure to fix our ideas, previous to an examination into the subjects of vaccination and of revaccination.

It is a matter of experience that those who pass in safety through one epidemic may be attacked in the next. Probably this arises from no change in the nature of the variolous virus, to whose influence they are exposed, but from some modification in their own habits and constitution, by which they are rendered, so to speak, more susceptible of its influence at one time than at another. A French writer, in speaking of the epidemic at Provence, describes it as "an epidemic so terrible that old men of seventy-four years, whom the small-pox had, so to speak, till then forgotten, finally paid their tribute to it, and several among them became its victims." The Royal Society reckon that there were in Marseilles, during the epidemic of 1827, among the rest of the population, 2000 who had had the variola previously; of these about 20 were attacked with the prevailing disorder, and 4 of the number died.

Dr. Cross, in his work already referred to upon the variolous epidemic of Norwich, remarks, that in *several* instances he had met with severe small-pox in adults who had, at various times before, both in Norwich and

London, resisted the intimate and continued exposure to contagion, and who had, therefore, good reason to suppose themselves forever free from it. "But" (to use his own words), "the most singular instance of the kind that I have ever heard of was communicated to me lately by my father-in-law, Mr. Bayly, who received the anecdote from one of the Suttons, with whom he was well acquainted. A man who believed himself to have had the small-pox, lived for *twelve* years as a nurse in the establishment for the reception of inoculated patients, which the Suttons had near Norwich, continually waiting upon the patients who were undergoing the disease; and at the end of that time he caught the small-pox, of which he died." He also gives another case of the confluent kind, occurring in a patient aged *24* years, who had been inoculated in childhood, at which time he was covered with a copious eruption and was ill for three weeks.

Unfortunately, I have not been able to obtain access to such statistical documents as will establish the exact proportion of secondary attacks; but, beyond a doubt, at the time of Dr. Jenner's publication of the "Inquiry," it had escaped the attention of medical men, "that small-pox occurred a second time as frequently as it has been proved to do, both by recent experience and past history."

Either the recurrence of small-pox under the following circumstances: previous inoculation, or after the natural disease, was by no means rare; or people were deceived as to the disease itself.

**3. Vaccination.**—Let us now consider that mild operation, intended to protect from the ravages of this fell destroyer, for which the name of Jenner has passed into every tongue and language throughout Christendom. To trace the gradual progress of his mind in the steps taken preparatory to the introduction among mankind of this useful and protective measure, would indeed be interesting, but would lead us too far from our object. From Baron's Life of Jenner it would appear, that the subject had occupied his attention from a period quite early in the pursuit of his medical studies, it being one of those sayings among the country people, that cow-pox was security against small-pox.

Encouraged by his master, John Hunter, who never permitted suggestions to lie dormant in the mind of any pupil, he seems to have fixed an ardent gaze upon this point of vaccination, like a bright star just appearing to the vision of the astronomer in the clear blue firmament, whose track it is to be his duty to discover, and point out. Perplexities and obscurities stood in the way of the calculations, which the bold hand of genius could not overcome, but only the patient onward march of industry. It was not to be the work of days and hours, but of years, spent in untiring effort. From 1775, when, by his own account, he first sat himself down in earnest to the task, until the 14th of May 1796, when the first successful experiment of inoculation with cow-pox virus was performed, by taking matter from the hand of Sarah Nelmes, infected by milking her master's cows, and inserting it into the arms of James Phipps, was but one continued train of experiment, careful investigation, and diligent research; for his was not the mind to allow error to creep in through inadvertence—he worshiped the truth. Every one knows the height to which the mind can be wound, when some great personal interest is at stake; but from this middle of May, to the first of the ensuing July, what must have been the state of Jenner's mind! the test by inoculation with variolous matter had yet to be performed. The altar had been erected, and a victim found; would

the offering be received? It was,—and when, on the 1st of July, 1796, this boy was tested with variolous inoculation, no disease followed, and the chain of evidence was complete.

In 1798, all things having been arranged, Jenner came forth to the world with his Inquiry into the Cause and Effects of the Variolæ Vaccinæ. God bless thee, Edward Jenner, as the nations of this earth have already done thy name, for the words then spoken!

This is not the place wherein to trace the steps by which he became acquainted with the rise and progress of the vaccine disease; it has already been done by abler pens and clearer minds.

From the time of its first introduction, the practice found favour, and was very soon in general use throughout the civilized world:—but whence comes it that, while in the earlier years, the voice of vaccinators was universal and unanimous in favour of its absolute protection, they now hesitate to speak so decidedly of its efficacy? that they now talk of depreciation in the virtues of the vaccine virus, a temporary protection, the degree of constitutional disturbance, number of vesicles, and the like? what is the truth of the matter? perhaps a fair examination of such data as are within our reach may afford an answer. And having already examined into the fatality of small-pox, both before and during inoculation, let us now inquire,—what has been the fatality of small-pox since the introduction of vaccination?

No one, I believe, is willing to allow that the epidemics now occurring, are as fatal as they were; upon this one point all are agreed, that from some cause there do not so many of those attacked by small-pox, die of the disease, as in former years. This cause is vaccination, for where it does not afford absolute protection to the individual, it, in a degree, modifies the disease from variola to varioloid, or, at any rate, mitigates the violence of variola vera.

A table was constructed by Sir Gilbert Blane to illustrate the comparative fatality of small-pox at four different epochs: the 1st, being the 15 years previous to variolous inoculation; the 2d, 15 years after the introduction of inoculation; the 3d, 15 years prior to vaccination, and when, of course, the knowledge of inoculation was most widely disseminated; the 4th, embraces a period of 15 years since vaccination came into general use:—

1st. From 1706 to 1720	Deaths 79 in 1000
2d. " 1745 to 1759	" 89 "
3d. " 1785 to 1798	" 94 "
4th. " 1803 to 1818	" 53 "

We have already spoken of the deaths by variola in *Copenhagen* from 1749 to 1808, (the table of which is given on page 122), and we must here add, that

From 1800 to 1804, *not one* case of variola occurred in a vaccinated person.

In 1804, *two* cases of the modified variola, or varioloid, were observed.

In 1805, *five* died of the varioloid.

In 1806, *three* died of the varioloid.

In 1808, there were *forty-six* deaths by variola, thirteen of which were by the varioloid.

Contrasting, then, this entire decennial period (1799 to 1808), with the preceding (1789 to 1798), and the deaths were diminished during the latter by upwards of three-fourths. According to one writer, the annual

mortality during the latter epoch was reduced to 60, but calculations drawn from the statistics of a country are more worthy of confidence than general statements.

Dr. Bremer, of *Berlin*, gives a table, by which it is declared that there died in that city of small-pox,

During inoculation, from 1790 to 1799,	4117
“ vaccination, “ 1808 to 1817,	1367,

being a diminution by 2750 of the number of the deaths : or there

Annually died during inoculation	412
“ “ “ vaccination	137,

the ratio being diminished by more than one-half. In 1812, the National Vaccine Establishment was founded, and the annual mortality from small-pox diminished to 50 ; from 1817 to 1821 it was 12 ; in 1821 and 1822 only *one* death each ; in 1823, when small-pox was epidemic in Prussia, there were in Berlin 200 cases, of which 5 died ; a result, which is contrasted by Hufeland with the epidemic of 1801, when there were 16,000 cases, of which 1646 died.

In *Sweden* the number of deaths from small-pox were

From 1782 to 1791,	47,587
“ 1792 to 1801,	44,184
“ 1802 to 1811,	14,904
“ 1812 to 1821,	3,309.

During the 25 years preceding the discovery of vaccination, the annual number of patients received into the Small-pox Hospital of *London* was 286; from 1800 to 1824, the average was reduced to 143.

Vaccination was introduced into *Vienna* by Dr. De Carro, in May, 1799.

The effect of it was so great, that in the year 1804 only *two* died of small-pox in the whole city, and these two cases were from abroad. By Report of the National Vaccine Establishment, 1812, on the authority of Drs. De Carro and Sacco, Vienna had been free from small-pox for five years, and Milan for eight.

In *Ceylon*, between the years 1802 and 1810, under the direction of Dr. Christie, 128,732 persons were vaccinated, and consequently, the small-pox was unknown from Feb. 1808 till Oct. 1809, when a few cases occurred, which were arrested by timely vaccination.

In the report presented to the Governors of the *London* Small-pox Hospital, Dec. 1818, by Dr. Ashburner, a calculation is made of the number of deaths among the patients admitted 20 years before and 20 years after the introduction of vaccination, showing the deaths

From 1778 to 1798 to have been	1867
“ 1799 to 1818 “ “	814

A diminution of                            1053

In the history of small-pox, by James Moore, Member of the Royal College of Surgeons, published in 1815, may be found the following extract from a letter by Dr. A. Crighton, Knight of the Order of St. Walmoden, and Physician to the Emperor and Empress Dowager of *Russia*, dated at St. Petersburgh, Sept. 12th, 1812. “ The whole number of the children inoculated with the vaccine, (from the year 1804 to 1812,) concerning whom the government has received certain information, amounts to 1,235,597. Now, supposing, according to a well-founded calculation, that before the intro-

duction of vaccine inoculation, every seventh child died annually of the small-pox, vaccination has saved the lives, in this empire, of 176,514 children.

Tables have already been given to display the ravages of this disease in the city of Boston, at various seasons during the eighteenth century ;—a great contrast will be found in the peculiar epidemic of 1839 and 1840.

During the month of July 1800, Dr. Waterhouse, then professor at Cambridge, vaccinated successfully four of his own children and three domestics, (these being the first vaccinated upon this continent,) not long after which they were inoculated for the small-pox without success, and again after the lapse of seven years with like issue. From this introduction, and the experiment performed, on one of the islands in the harbor of that city in 1802, of inoculating with variolous matter, a number of boys, who had passed through the cow-pox, and thus establishing their perfect immunity, the practice continued to increase, until, by regulation of the Board of Health, it was provided, that every person attacked with natural small-pox, (for the inoculation was forbidden under heavy penalty,) should be removed to the quarantine ground, situated upon an island at some distance from the city. About 1838, this, with other quarantine regulations, was abolished, and in the summer of 1839, the year following, an epidemic of small-pox broke out.

From 1811, when a new system of registration for the city bills of mortality went into effect, to 1838 inclusive, there were but 39 deaths by small-pox in all. In 1839, there were 60 deaths by this disease, and in 1840, they amounted to 116. In fact, such was the virulence of the epidemic, that secondary small-pox, *i. e.*, after the individual had once passed through the disease, whether by the natural way or by inoculation, was of common occurrence,—two cases of this kind, where the previous attack had been natural, fell under my own observation. In May, 1840, a census was taken, by which the number of stationary inhabitants was found to be 84,311 white, and 2,321 coloured; thus plainly showing that this year, when, in truth, many cases of varioloid, in all its different forms, occurred, and when small-pox was evidently and indisputably epidemic, there was but *one* death to 746 inhabitants; in 1792, when it was also epidemic, the population of the city being 18,038, the deaths were *one* in 91 of the inhabitants, the entire number from this disease during the latter year being 198.

An experiment similar to that by Dr. Waterhouse, was performed upon a larger scale by the old *French* committee, in the year xi., (1803): 202 vaccinated persons were inoculated with variolous matter, producing in 84 no effect; in 18 local irritation, but no fever, malaise, or eruption; in one there were two pustules of variolous appearance, such as not unfrequently appear upon nurses and physicians in charge of patients with variola. In 1811, the Minister of the French Interior, in his address introducing the report of the National Committee of Vaccination, asserts, that 1,400,000 children were annually born in the French empire; that in former years, 1,000,000 annually went through the small-pox, of whom 150,000 died. In 1811, there were 70,000 cases of small-pox, and 8,500 deaths.

Data similar to those already given, might be collected from the records of nearly every known nation, proving that the fatality of small-pox, in the entire mass of the population, since the introduction of vaccination, has become of no account. Still, it is established that some cases have arisen, and, therefore, it becomes necessary to extend our investigations.

**4. The recurrence of small-pox after vaccination.**—When we consider the ease and simplicity of the operation, it is not to be wondered at, that many parents and others should have taken upon themselves to propagate the disease, without a requisite degree of acquaintance with the peculiar characters of the genuine vesicle. Besides, as the spurious, equally with the genuine cow-pox vesicle, leaves its scar behind, it will be very difficult, if not impossible, for the physician to determine in after years with regard to the genuineness of the disease. After such imperfect protection an attack of small-pox might be expected; but it is alleged, that the cases of secondary small-pox, or small-pox subsequent to vaccination, are increasing in frequency of late; and having now become so numerous as to prove the fallacy of the argument from the spurious vesicle, an explanation must be sought from another source. The great objection to all data here, and one which I do not know how to obviate, is, that out of the vast number, not only bearing upon this point, but also upon revaccination, the actual proportion, in which the previous operation proved successful, cannot be ascertained. The best and most certain method would be, for a body of physicians to record the cases of secondary small-pox in individuals, whom they had themselves vaccinated, and whose vaccinations they had marked in their note-books as perfect; in the absence of data so convincing, we must take what we can find.

Let us return once more to the statistics of *Copenhagen*, as furnished by Dezeimeris, in the *Encyclographie des Sciences Médicales*, for Oct. 1838. From the year 1808, (consult page 12,) the number of the vaccinated attacked with variola or varioloid, continued to increase until 1819, when they attracted universal attention. In 1823, an epidemic broke out, and the erection of a special hospital became a measure of necessity. Of this, Dr. Nicholas Christian Moche was appointed physician, from whose reports are drawn these tables.

From the 1st of January, 1824, to Feb. 28th, 1825, there were received 412 cases, of which 40 died; of these

257 had been vaccinated,  
58 had had the variola,  
97 had neither been vaccinated nor variolated.

Of these, 16 were cases of true variola, of which 3 died, but what proportion occurred among the vaccinated, if any, is doubtful.

From the records of the same hospital it appears, that another epidemic broke out in Sept. 1825, and continued to the middle of 1827, in which time were admitted 623 cases of variola or varioloid; of these, 438 had been vaccinated, of whom 26 had the genuine variola, and 2 among them died.

A third epidemic continued from March, 1828, to July, 1830, during which period 562 cases were admitted, the care of the hospital having passed into the hands of Dr. Wendt. There were attacked with true variola 111, viz.:—29 vaccinated, of whom 4 died, or 1 in 7; 1 doubtful; 84 not vaccinated, of whom 24 died, or 1 in 3½.

From Aug., 1832, to the end of 1834, there raged a most violent epidemic; cases admitted, 1045; deaths, 45; viz.:

147 unvaccinated, of whom 34 died, or 1 in 4,	
898 vaccinated, " 10 " or 1 in 90,	

All the deaths occurred among the cases of *true variola*, being 179, viz. :

119 unvaccinated, of whom 34 died, or 1 in  $3\frac{1}{2}$ ,  
60 vaccinated, " 10 died, or 1 in 6.

From the middle of May, 1835, to the end of that year, there were admitted to the hospital 1197 cases, of which 106 died. Of these there were

Vaccinated, 1043, of whom 47 died, or 1 in 22,  
Unvaccinated, 123, of whom 51 died, or 1 in  $2\frac{1}{2}$ ,  
Doubtful, 31, of whom 8 died,

The reports from the *London* Small-pox Hospital, under the charge of Dr. Gregory, furnish evidence every way as conclusive, with regard to the recurrence of the disease after vaccination, and moreover, that this tendency is on the increase, e. g.

For the 25 years preceding the discovery of vaccination the annual

average was	286
From 1800 to 1824 the annual average was	143
In 1825 "	419
From 1826 to 1837 the annual average was	270
From 1837 to 1838 "	740

In 1823, Dr. Gregory published a table from which are drawn the following proportions of persons attacked after vaccination.

In 1809 one in 36	In 1819 one in 6
In 1810 " 30	In 1820 " 6
In 1811 " 15	In 1821 " 4
In 1814 " 20	In 1822 " $3\frac{1}{2}$
In 1815 " 17	In 1838 " $2\frac{1}{2}$
In 1818 " 6	

The following table, exhibiting the comparative fatality of small-pox among the unprotected and vaccinated at the small-pox hospital, London, during the epidemic of 1830, also presents the fatality of variola after vaccination in contrast with that before.

	Unprotected.		Vaccinated.	
	Admitted.	Died.	Admitted.	Died.
Confluent	295	149	56	21
Semi-confluent	78	8	42	4
Distinct	19	0	20	0
	—	—	—	—
Total normal	392	157	118	25
Confluent modified	2	0	38	4
Semi-confluent modified	1	0	23	1
Varicelloid	1	0	114	1
	—	—	—	—
Total abnormal	4	0	180	6
Grand total	396	157	298	31

In 1836, there were admitted into this same hospital 329 patients, of whom 128 were after vaccination.

Some remarks were made by Dr. Gregory at a meeting of the Royal Medical and Chirurgical Society, in Dec. 1838, from which has been prepared the following abstract. The examination of from 600 to 700 cases shows a modification of small-pox in 60 per cent. of the vaccinated; of the 40 per cent., in whom unmodified, the results and mortality are the same as in the unvaccinated. In 100 cases of small-pox after vaccination there would be 9 deaths, in 100 cases among the unvaccinated, the deaths would average 25.

The following table, embracing 90 cases, is taken from the *Lancet* for January 19th, 1839, and occurred during the year before.

Ages.	Cases.			Deaths.	
	Before vac.	After vac.	Small and vac.	Before vac.	After vac.
1 to 15	18	28	5	5	
16 to 25	6	16	1	0	1
26 to 35	0	9	0	0	0
36 to 45	0	5	0	0	0
50 to 70	0	2	0	1	0
Total	24	60	6	6	1

In almost direct opposition to the evidence afforded by such documents, M. Bousquet asserts, that "if secondary variola, I mean the true variola, attack one in a thousand of the vaccinated, it is all. Therefore, it follows, that of ten thousand vaccinated, the small-pox would attack ten, and from this number there will be one death, since it is proved, at least, to decimate those whom it attacks,"—evidently a mere expression of opinion. In this connection it will not be amiss to introduce, from the same author, an authentic account of the epidemic of Marseilles, already alluded to, exhibiting, as it does, the degree of protection afforded by vaccination, the frequency of the recurrence of small-pox after vaccination, and the mortality of variola among the unprotected.

In the same Journal, for Dec. 21st, 1844, we find that Mr. Marson, of the Small-pox Hospital, represented to the Westminster Medical Society, that at no period since its foundation, with the exception of the years 1781 and 1838, had there been so many patients in the hospital. The ages of those admitted after vaccination, in five cases out of six, were between 18 and 23. Where the cicatrix was perfect, the disease was three times less fatal than where it was imperfect.

The epidemic of Marseilles, in 1828, attacked no infant under three months, and no individual above 30 years; now it was estimated by the Royal Society that there were in the city 40,000 inhabitants of this condition. These it divides into three great classes, viz.:—

30,000 vaccinated ; 8,000 not vaccinated ; 2,000 variolated.

Of the vaccinated 30,000, there were attacked 2,000, or one-fifteenth.

" unvaccinated 8,000, " " 4,000, or one-half.

" variolated 2,000, " " 20, or one-hundredth.

Of the 2,000 cases among the vaccinated 20 died, or one-hundredth.

" 4,000 " " unvaccinated 1,000 " or one-fourth.

" 20 " " variolated 4 " or one-fifth.

Dr. Cross gives five cases of small-pox after vaccination, of which he was informed by his correspondents, and adds: "If we consider, that above two-thirds (87) of all the medical men within a district comprising not less than 350,000 inhabitants, communicated to me their opinions ; and that, after the end of the year 1819, I continued my researches in every quarter where I heard of reported failures, up to the time when I arranged this sheet, (May, 1820,) it is scarcely assuming too much to state, that it is probable this contains nearly every fatal case of small-pox which occurred, during the epidemic in the country around Norwich, in persons believed to have been vaccinated. The number is reduced to *one*, who was attended during the fatal disease, by the surgeon who vaccinated him, *another* vaccinated by an unknown medical man, and *three* by old women ; and compared with the number vaccinated, and the great proportion of those who

must, within the last year and a half, have been exposed to the small-pox, we may regard it as a triumphant proof of the fatal effects of the latter disease being generally prevented by the cow-pox." Upon the same authority it is asserted, that the 200 cases of small-pox after vaccination, recorded by Pougen, were without danger; Hugo's 50 cases at Crediton terminated favourably; and, in short, that nearly all the cases of *modified* small-pox related by some writers, English and German, were without danger.

In 1812, a document was drawn up by MM. Berthollet, Perce, and Halle, for the Provincial Vaccine Institutions throughout France, by order of the government; in this it is affirmed, that of 2,671,662 persons *properly* vaccinated in France, only 7 cases of subsequent small-pox appear, or 1 in 381,661; and well-authenticated instances of *secondary* small-pox are far more numerous, in proportion.

In the epidemic of Tuttlingen, 1833, Dr. Rösch had charge of 59 cases of small-pox, 52 of which were in the vaccinated.

In 1831, Gambriani gives 748 cases of various degrees of variola, 643 of which occurred in the vaccinated.

Thus, perhaps, sufficient statistical evidence has been brought forward to establish the fact of an increasing recurrence of small-pox after vaccination—an increase greater in proportion than the increase of population, or the increasing numbers submitted to the operation, whereby, of course, an occurrence at first quite rare would be rendered very common, can be allowed to account for.

The disease occurs either in its natural state, as the true variola, or modified, as the varioloid; for often the variola does not show itself after vaccination with its own peculiar attributes, but is mollified and modified, whence the name *varioloid*, evincing, at the same time, the form and the nature of the disease.

5. *Vaccination as affected by the lapse of time.*—Some have even gone so far as to raise the question with regard to the degeneracy of the vaccine virus in use at the present day, but the opinion is rather one of speculation than of actual value. In fact, it is incorrect; the only experiments I am aware of, being in Germany, and the effect of inoculation then, within a short time of vaccination, was, as in the days of Jenner, confined to local irritation. One of two things must be allowed: either there has been a degeneration of the virus, or the protection afforded by vaccination is temporary. To my own mind, the data about to be brought forward, are as well accounted for upon the latter hypothesis as upon the former; and, in the alternative of two evils, not only is it best to choose the least, but the one which rests upon the surest foundation. Moreover, if the virus have actually degenerated, revaccination would prove more successful in those most recently vaccinated, but the contrary has been found true, the success of revaccination depending upon the lapse of time since the first performance of the operation.

The first data which I shall bring forward under this head, are from the work of Thomas Brown, *On the Anti-variolous power of Vaccination*, being an abstract of 48 cases, in which variola appeared in some form after vaccination. It is given merely because the volume, from which it was obtained is now before me, and I did not feel authorized wholly to exclude the data of any one; but from the looseness with which the cases are recorded, the want of distinction between the true and the modified variola, and more than all, the avowed prejudice of the author, not much confidence

can be placed in them. One fact they certainly establish, that the vaccinated are comparatively free from the fatality of small-pox; for, while the epidemic was raging with such virulence around, that many even among the vaccinated were attacked with it in a modified form, out of the 48 cases there was not a single death. Of these 48 there were

20	from 2 to 5 years of age,
24	" 5 to 10 "
1	" 10 to 15 "
3 not mentioned as to age.	

The date from vaccination was

Under 6 months in	1
From 1 year to 18 months in	1
" 18 months to 2 years in	1
" 2 years to 30 months in	4
" 30 months to 3 years in	6
" 3 years to 5 years in	17
" 5 years to 10 years in	18

The cicatrices were

Distinct in	28
Large in	12
Small in	2

Not mentioned in six; the form of attack seems to have been the same in all; the universal result was recovery.

In 1823, Dr. Gregory furnished a table of the relative ages of 137 persons attacked by small-pox after vaccination, as follows:—

Below 10 years of age	5
From 10 to 20 "	76
" 20 to 27 "	56

Of the patients admitted to the hospital, under his charge, in the epidemic of 1838, in all 329, of whom 128 had been vaccinated, the ages were

From 1 to 5 years (inclusive)	0
" 6 to 10 "	2
" 11 to 15 "	11
" 16 to 20 "	40
" 21 to 25 "	49
" 26 to 30 "	20
" 31 to 40 "	5
Beyond 50 "	1

The language of this gentleman, as reported in one of the public journals, was: "It is no proof that the vaccination has been perfect, because the child has been exposed to small-pox and did not receive it. Puberty and other changes which take place in the system, between the ages of 15 and 25, put vaccination to the test. All the severe cases of small-pox after vaccination, which he had seen, had, without a single exception, occurred 15 years after the latter affection. He had seen no severe case which occurred at a period shorter than this. One or two very mild varioloid cases had occurred in children between 8 and 9 years of age; none, even of this form, earlier. The earliest death from small-pox after vaccination was at 15, and the mortality increased as the persons advanced in life, the greatest number occurring from 25 to 30." The assertion contained in this latter sentence does not exactly coincide with the rate of mortality, as presented by the tables of this very hospital, during the epidemic of 1838, from which it will be seen, that the greatest number of

cases and proportional mortality were both in the unvaccinated and the vaccinated between the ages of 15 and 25, or more especially from 20 to 25. Of the vaccinated, who were admitted, 114 had the varicelloid; 66 had the disease, severe at first, but shortened and modified in its subsequent stages, while 118 (or 40 per cent.), underwent the disease in a regular, normal, or unmitigated form; and in them the rate of mortality was nearly the same as in those who had never been subjected to the operation. This is the table:—

Ages.	Unvaccinated.		Vaccinated.	
	Admitted.	Died.	Admitted.	Died.
Under 5 years of age,	42	20	0	0
From 5 to 9 inclusive,	37	11	5	0
“ 10 to 14 “	30	8	25	0
“ 15 to 19 “	104	32	90	6
“ 20 to 24 “	115	50	106	16
“ 25 to 30 “	45	23	55	8
“ 31 to 35 “	12	7	13	1
Above 35 years of age,	11	6	4	0
Total,	396	157	298	31

At the meeting of the same society where the remarks above given were made by Dr. Gregory, it was asserted by Dr. Copland, that from data collected by himself he was convinced, that the protection of vaccination did not extend beyond a seventh or eighth year; the small-pox would then be modified, but unmodified generally from the fifteenth to the nineteenth year,—at first, the protection was perfect, then imperfect, this imperfection gradually increasing in degree with the lapse of time.

In the first *Copenhagen* epidemic recorded by Moche, from Jan. 22d, 1824, to Feb. 28th, 1825, of the 257 vaccinated who were attacked, the ages were:—Under 7 years 24  
From 7 to 11 “ 42  
“ 12 to 23 “ 191

In the epidemic of the same place from March, 1828, to July, 1830, when 562 cases were admitted to the special hospital, “one only among the vaccinated was but four years and a half old; the others were adults, and had almost all been vaccinated in the earlier years of the introduction of vaccination into Denmark.”

From another table by the same author, it appears, that of 653 cases of *modified* small-pox, the ages were,—Under 10 years 82  
From 10 to 20 “ 356  
“ 20 to 30 “ 209  
Above 30 “ 6

and that not a single case of true variola appeared in a child under 14 years of age; not a single case of mortal variola in an individual under 23; and not a case of any form of variola in a revaccinated.

Of the 1197 admitted to the hospital from May 11th, 1835, to the end of that year, 1043 had been vaccinated, among whom were 47 deaths, not one of which was in an individual under 18 years of age, three were in the eighteenth or nineteenth year, and all were removed by more than fifteen years from the date of their vaccination.

It were well to take one more glance at the table of M. Mathieu, to be found upon page 000.

Heim has given the ages of 176 persons attacked with variola vera after vaccination, as follows:

	Under 5 years	6
From 5 to 9	"	9
" 10 to 15	"	31
" 15 to 20	"	46
" 20 to 25	"	39
" 25 to 30	"	30
" 30 to 35	"	15
		176

From yet another table by Dr. Heim of the vaccinated who were attacked by modified small-pox during the Wurtemberg epidemic, the whole number of cases being 1025, the ages were

Under 10 years	94
From 10 to 20	" 1107
" 20 to 30	" 502
" 30 to 35	" 22

In an epidemic observed by Rösch, of Trossingen, out of 58 cases of small-pox after vaccination, there were

Under 10 years of age	7
From 10 to 20 years	29, of whom 2 died.
From 20 to 30 years	22, of whom 2 died.

Of these, the 7 under 10 years of age were mild, without a death; of those from 10 to 20 years of age, 13 were mild, 12 moderately severe, 2 dangerously affected, and 2 (one aged 11, and the other 19 years), died; of those from 20 to 30 years of age, 13 were moderate, and 9 severe, so that of the latter 2 died.

In Sweden there were, in 1834, 560 deaths from small-pox, of which 103 occurred in those vaccinated in infancy, all of them being upwards of 15 years of age. A result nearly similar was obtained by Hedlund, who found that of 69 persons attacked with true variola, 34 were adults, whose vaccination dated from 16 to 18 years previous; in the same epidemic he met with 91 cases of varioloid.

But when do these cases usually occur? Not in common times and seasons, but when the epidemic has reached its acme. At the commencement such cases are not found, nor yet at the end, in so great numbers, for the course of small-pox is to increase at an accelerated and then at a retarded rate, until it has reached its acme in numbers and virulence. At this time the cases of variola, or of the varioloid, appear in the vaccinated, and not till this time, when the disease is doing its worst in the most concentrated and virulent form of the contagion; and they decline with the disease, which "declines first at a slightly accelerated, then at a rapidly accelerated, and lastly at a retarded rate, until it attains the minimum intensity, and remains stationary."

Thus might we go on accumulating evidence from the history of every epidemic which has visited the civilized world within the past ten years, whereon to rest our conclusions, but enough data, it seems to me, have been advanced from which to make the following deductions:

1st. That the protecting power of vaccination is perceptibly diminished by lapse of time; the gradations being perfect security, the varioloid, variola.

2d. That at the period of puberty a change takes place in the constitution by which the immunity is greatly diminished, and that *prior* to this period we never find true variola to occur after vaccination.

Can any evidence as to the safety of the individual be drawn from the character of the cicatrix? I think not; because the cicatrix or scar is but the evidence of some injury to the structure of the part, and it certainly would be most absurd to expect this to fade away at just the right moment. Allowing that the shape, indentations, and other peculiarities of the vaccine-scar permit us to distinguish it from any other, still all this only shows that in time gone by there was a peculiar sore in this spot, which has left its marks behind. It does not show the degree of constitutional disturbance, if any, nor yet does it reveal to us whether any of those many injuries to which it was constantly exposed, happened to the vesicle in its course by which the effect was lost.

Not much time need here be spent in the collection of data, and we will begin our researches by including nearly all the cases already given of small-pox after vaccination, the scar upon the arm being regarded as evidence that it had been performed. Great weight must also be placed upon the success of revaccination in such cases, and which will be found recorded under that head: in this place I shall content myself with two instances only.

The first is from the Wurtemberg epidemic, in which, "of 1055 cases of small-pox, in which the marks were visible, 914 had good, and only 141 imperfect marks; 147 of these, notwithstanding that the vaccine marks were normal, were cases of genuine small-pox."

The second is the opinion of Dr. Gregory, whose experience certainly has been most extensive, who does not consider that the character of the cicatrix affords any evidence of the success of the operation, nor yet of the small-pox, which may afterwards occur. Moreover, that in the very worst cases which he had witnessed after vaccination, there were excellent cicatrices. "Two persons in whom the vaccination had been perfect, died," one aged 29 years.

The cicatrix, then, affords no evidence of the security of the individual, or the success of vaccination.

*Age.*—It is a matter of some moment to determine the age at which vaccination should be performed in order to secure its beneficial effects. That it may be performed at too early a period, there can be no doubt. From an examination of the tables of deaths from small-pox, given page 130 and page 131, and from the fact that during the Marseilles epidemic no infant below three months of age was attacked, I am inclined to fix upon the period from three to six months, about which time the variolous inoculation was performed. This early performance is indeed objected to by some German authors, but not, as it seems to me, upon sufficient grounds, for while they advise that no child should be vaccinated within the first twelve mouths, because the vesicles do not then appear so perfect, others are of opinion that the vesicles are full as brilliant, and the operation as effective at an earlier date.

Great stress has been laid by some of the recent European writers upon the number of vesicles and the degree of constitutional disturbance, as affecting the protective power; but it may be questioned whether the effect of the punctures is as likely to be merely local at a primary as upon a subsequent vaccination. This point is not then one of much importance; for an equal

degree of protection is afforded by one or more vesicles, provided only that the evidence of constitutional disturbance be plainly marked.

When, therefore, the course of the vaccination has been regular from first to last,—the vesicles undisturbed,—the areola not too extensive,—attended by a certain amount of general febrile disturbance,—the individual labouring under no other disease to modify its influence,—then may we pronounce the vaccination to have been perfect.

The protection thus afforded the individual is perfect for the first few years, it then becomes imperfect, and the individual (if exposed) is liable to be attacked by some of the varioloids; finally at puberty such change takes place in the constitution that many individuals lose even this degree of protection, and become again liable to the true variola. Vaccination performed after this period may be considered in most cases to afford absolute protection.

**6. Revaccination.**—Within a very short time the practice of revaccination has been introduced, as affording protection under circumstances where the primary operation failed. The limited period which has elapsed since the practice came into notice, renders it almost impossible to judge with accuracy of its ultimate effects. This must be determined by the lapse of time, and the return of several epidemics.

If, as was the opinion of Jenner, and has recently been perfectly established by the experiments of Dr. Sunderland, of Bremen, Dr. Thiele, of the southern part of Russia, and Mr. Ceeley, of Amesbury, England, (all of whom have succeeded in producing the regular vaccine disease by affecting the cow with small-pox,) the variolæ vaccine are a mild or modified species of the small-pox, then must they follow in a mild or modified degree the same laws which regulate the small-pox. If then the latter does not afford perfect security from a subsequent attack of the disease, neither yet can the former be expected so to do, for if it be modified its protective power must be modified also.

As a measure of security revaccination is evidently required in all cases where the success of the primary operation is doubtful, and if our deductions be allowed, it must be performed about the period of puberty, not only with the view to expediency, but even to *protect* in case of the eruption of an epidemic.

The revaccinations in the Danish army for 1837-8 display, in a remarkable manner, the negative evidence of the cicatrix, and also the increased protecting power of revaccination.

Year.	Number Re-vaccn.	Cicatrices of former Vac.		Result of Revaccination.		
		Distinct.	Indistinct.	Genuine Ves.	Not Gen. Ves.	No Result.
1837	3741			1601	1015	1125
1838	3721	3317	404	1464	1000	1257

Of the number who in 1838 resisted revaccination, 129 had had the natural small-pox, and 111 had been twice revaccinated. In the same year there were, in the whole army, 24 cases of small-pox, partly in children, (modified or unmodified is not stated.) Of the individuals who have been successfully revaccinated, not one has been attacked with small-pox.

But a table of far greater value is contained in the *British and Foreign Medical Review*, for July, 1836, being translated from *Rust's Magazin*, band. xlv., heft. i., 1835. It is entitled, "The Revaccination of the Prussian Army, for 1834."

1. The number of men vaccinated was	44,454
2. Of this number, had distinct marks of previous vaccination	33,634
"        "            indistinct marks	7,134
"        "            no marks	3,686
3. The present vaccination was regular in its course in	16,679
"        "            irregular "      "	12,287
"        "            without any result	15,488
4. Of the 15,488 in whom the vaccination entirely failed, there were revaccinated a second time     4,530	
Of whom took the disease     866	
No result                   3,664	
5. The number of true pustules in those who took the disease regularly was :—From 1 to 5 in     6,763	
"    6 to 10 in     5,028	
"    11 to 20 in     4,088	
"    21 to 30 in     800	
6. Of those who had been previously vaccinated, or on the present occa- sion were revaccinated and took the disease properly, 79 were affected with some form of variolous or varioloid disease in the course of the year, of whom had varicella     46	
varioloid               31	
true variola           2	

7. In the whole army, the number affected with varicella, varioloid, or true variola, in the year 1834, were, however, 619, including the 79 just given; consequently, in 540 of these patients the revaccination had been either irregular, had not succeeded, or had not been employed at all. Of these 619 soldiers 38 died of the true variola; of whom 2 had been vaccinated with effect, 6 without effect, and 30 (nearly all raw recruits) not vaccinated at all.

In contrast with this success is the performance of the operation, revaccination, among children, and first, that at the Foundling Hospital, London, in 1839:

4. The youngest of the 11 was aged 5 years, the eldest 13.

Dr. Kirkbride, of Philadelphia, revaccinated 209 children, upon some part of whose limbs a perfectly formed, rounded, stellated or punctated cicatrix was found; the average age was 12 years, the extremes being 6 and 20; of these, 44, or rather more than 21 per cent., had the disease perfectly. There is one more document, by Wendt, presenting a result so nearly similar to the last, that I shall give it:

Age.	Successful Revac.	Unsuccessful Revac.
From 1 to 10 years	33	1
" 10 to 20 "	216	82
" 20 to 25 "	2175	998
" 25 to 30 "	191	76
" 30 to 40 "	123	43
" 40 to 50 "	18	8
	<hr/> 2756	<hr/> 1208

To determine with any degree of certainty the actual value of revaccination will require more time and epidemics than have yet elapsed since its introduction. Of this only are we certain, that it is required in all cases of doubt with regard to the previous operation; and by all the laws of expediency, if not upon yet stronger grounds, within a short period after puberty.

In the number of this Journal for April, 1842, will be found a valuable paper, giving the details of 686 cases of revaccination, by the lamented Dr. Forry, to whose accurate Boylston Dissertation, in the *New York Journal of Medicine* for Sept., 1844, we would also refer the reader.

ART. XIII.—*Case of Imperforate Hymen.* By JNO. GEO. METCALF, M.D.,  
of Mendon, Mass.

CASES of imperforate hymen occur so rarely that some even doubt the reality of their existence. For this reason, and to preserve a more lasting record of an anatomical curiosity than the note-book of a country physician, the following case is offered for publication.

On the 15th of May last, I was called to see Miss G., aged 15. Arriving at her father's house, I found the patient suffering severe pain over the region of the sacrum, extending through in the direction of the pubis; micturition frequent and scanty in quantity; pain of an intermittent character, occurring at short intervals, and has been quite severe for the last two days; the tongue has become somewhat coated, white, but moist; appetite impaired; abdomen neither tense nor tender upon pressure; bowels open; pulse natural.

Upon further inquiry found she had never menstruated. From her age and present symptoms, made up my mind that that function was about to make its appearance, and so made the following prescription. R.—Morph. sulph. gr. one-fourth, once in two hours, pro re nata. Stupes to vulva. Pediluvium at bed-time.

May 16th. Calling on my patient this morning I found her much relieved from the pain, but there was no appearance of the menses. Finding the bowels were somewhat constipated I made the following prescription:—R.—Pil. aloet. for cathartic and emmenagogue. Continue recipe of yesterday.

17th. Found my patient about her work, the physic having operated well and the pain all gone. No menstruation had appeared. Without further inquiry the case was dismissed.

20th. Passing by her father's house this morning, I was again called to see Miss G., who was reported to be quite sick. Entering her room, I found her in great pain, so as, frequently, to make her cry out. On